Research Article

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Acute respiratory tract infections in children under 5 years of age in Upper Egypt

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ABSTRACT

Background: Acute respiratory infection (ARI) is a serious problem that causes four and a half million deaths among children every year, the overwhelming majority occurring in developing countries. Untreated ARIs often lead to pneumonia, which is more serious and causes 15% of under five deaths in Egypt. The objectives of the present study were to identify the prevalence of ARIs in children under 5 years of age in Upper Egypt and its determinants.

Methods: Secondary analysis was done in the present study based on data sets of Egypt Demographic Health Survey (EDHS), 2008.

Results: The present study involved 4,745 children under 5 years of age living in Upper Egypt Governorates who included in EDHS, 2008. The mean age of the studied children was 28.27 months. It was found that 18.8% of the children had cough during the two weeks period before the survey. Medical consultations were sought from health care providers among 90% of children. Nearly two thirds of the children were given any drugs. Cough drugs and oral antibiotics were given most frequently. Also, 30% of children did not receive any medical treatment .Children aged 6-23 months and male children were affected most likely with ARIs. Immunization status of the studied children showed significant association with ARIs.

Conclusions: Children aged 6-23 months and male children were affected most likely with ARIs. Paediatricians and general practitioners should take their role in proper counselling of caregivers on the proper child care at home.

Keywords: Acute respiratory tract infections, Children under 5 years, Egypt

INTRODUCTION

Acute respiratory tract infection (ARI) is considered as one of the major public health problems and it is a leading cause of morbidity and mortality in many developing countries. The greatest problem of developing countries is the mortality from ARI in children under five years of age. Acute respiratory tract infections are heterogeneous and complex group of diseases caused by a wide range of pathogens in which the anatomic sites extends from the pharynx to the alveoli. Acute respiratory tract infections are classified as upper respiratory tract infections (URIs) or lower respiratory tract infections (LRIs). The upper respiratory tract consists of the airways from the nostrils to the vocal cords in the larynx,

including the Para nasal sinuses and the middle ear. The lower respiratory tract covers the continuation of the airways from the trachea and bronchi to the bronchioles and the alveoli.² ARIs are not confined to the respiratory tract and have systemic effects because of possible extension of infection or microbial toxins, inflammation, and reduced lung function.³ The incidence of ARIs is especially high among infants, children, and the elderly and is more pronounced in low and middle-income countries.⁴ The overall reported incidence of ARIs is 6-8 episodes during the first 5 years of life.⁵ Untreated ARI infections often lead to pneumonia, which is more serious and causes 15% of under-five deaths in Egypt.⁶ According to EDHS, 2008 (Egyptian Demographic Health Survey), one in 36 Egyptian children died before

their fifth birthday, with more than 80% of deaths occurring during a child's first birthday. Mortality is higher in rural than urban areas. The highest level is found in Upper Egypt and the lowest in Lower Egypt. A child was considered to have symptoms of an acute respiratory infection if he/she had a cough accompanied by short, rapid breathing that the mother described as related to a chest problem.7 According to DHS, 2014 (Demographic Health Survey) conducted in Egypt, more than one-quarter of children under five years of age had a cough in the two weeks before the survey; 14% had a cough accompanied by short, rapid, or difficult breathing that was chest-related, which is a symptom of an acute respiratory infection.⁸ The proportion of child mortality and morbidity attributable to ARI is not the only reason why these infections constitute a major public health problem. Given the frequency of these illnesses in children under five, the care that must be provided for them imposes a significant burden on parents and health services in terms of time and money. In addition; the care provided by the family and the health services is not always the most efficient way to treat these illnesses. Improper care often leads to complications and additional problems, such as those associated with the excessive and improper use of antibiotics, which is one of the main reasons for the recent rise in bacterial resistance to these drugs.10

The objectives of the present study were to identify the prevalence of acute respiratory tract infections among children under 5 years of age in Upper Egypt, determine the relation between different personal factors and ARI symptoms among the target group and determine the action taken by children care givers for consultation and treatment practices of the illness at home.

METHODS

The present study was carried out in the Governorates of Upper Egypt which included Giza, BeniSuef, Fayoum, Minia, Assiut, Sohag, Aswan and Luxor. The study subjects involved Children under 5 years of age living in Upper Egypt Governorates included in DHS, 2008.

Secondary analytical study based on variable number of data sets of EDHS, 2008 was carried out. EDHS, 2008 is the ninth in series of Demographic and Health Surveys conducted in Egypt. EDHS, 2008 was undertaken to provide estimates for key population indicators including fertility, contraceptive use, infant and child mortality, immunization levels, maternal and child health, and nutrition. To obtain these information, a nationally representative sample of 16,527 ever-married women aged 15-49 were interviewed.

The nationally representative DHS sample included all children under 5 years of age was 10,327 of them 4,745 were living in Upper Egypt. Sample selection is multistage, with census enumeration areas selected in the first stage with probability proportional to size. Households

are selected randomly from a complete listing of households within the selected enumeration areas. All women aged 15-49 in sample households are eligible to be interviewed.

Household and individual-level data from DHS program were used. Information on the prevalence of ARI was collected in EDHS, 2008 by asking mothers of children under five years of age three questions. The first question identified children who had been ill with a cough in the two weeks before the survey. For the children who had a cough, a second question was asked to determine if the child had breathed faster than usual with short rapid breaths or had difficulty in breathing. If the mother indicated that the child had experienced fast or difficult breathing, they were asked whether it was the result of a problem in the chest or a blocked or runny nose. Women whose children had ARI symptoms were asked whether they had sought advice or treatment for the illness.

An ARI episode was reported as respiratory symptoms by the mothers. A symptom of ARI as cough accompanied by short rapid breathing that is chest-related is considered proxy for pneumonia. In first level health care, pneumonia is recognized based on two simple clinical presentations: fast breathing and lower chest wall in drawing. When assess acute respiratory tract infection in the present study, the researchers depend on the definition of WHO as a case which had cough or difficult breathing. 9

Formal administrative approval was taken before the start of the study from the Ethical Committee of the study proposal. Approval from El-Zanaty and Associates for using the raw data of DHS, 2008 was obtained and security of the data was assured.

A candidate dataset has been identified. Data were analysed using SPSS program (version 16). DHS estimates are weighted to adjust for non-response. Data analysis included descriptive statistics; frequencies, percentages, mean and standard deviation. Then cross tabulations were performed. The differences in proportions among the groups were assessed using the Chi squared test and continuous data were studied using the student T- test. The 5% level was chosen as the level of significance with 95% confidence interval.

RESULTS

The personal characteristics of the studied children are presented in Table 1. This study included 4745 children less than 60 months. The mean age of the studied children was 28.27±17.45 months. Male children represented 51.1% compared to 48.9% were females. Nearly three quarters of the studied children were living in rural areas (74%). As shown in Table 2, 891 children suffered from a cough during the two-week period before the DHS survey with a prevalence of 18.8%. Less than three quarters of them (71.6%) had experienced short

rapid breathing as a result of a problem in the chest only (33.4%), or a blocked or runny nose only (14.4%). However, more than half of those had short rapid breathing (50.9%) suffered from blocked or runny nose and chest-related problem at the same time.

Table 1: Personal characteristics of the studied children, EDHS (2008).

Item	No. (n=4745)	%	
Age group (months)			
Less than 6	529	11.1	
6-	553	11.7	
12-	959	20.2	
24-	926	19.5	
36-	889	18.7	
48- 59	889	18.7	
Mean±SD	28.27±17.45		
Sex			
Male	2424	51.1	
Female	2321	48.9	
Religion			
Muslim	4410	92.9	
Christian	335	7.1	
Residence			
Urban	1233	26.0	
Rural	3512	74.0	
Birth order			
First	1310	27.6	
Second or third	1989	41.9	
Fourth or fifth	908	19.2	
Sixth or more	538	11.3	

Table 2: Distribution of the studied children by cough and related symptoms, EDHS (2008).

Item	No. (n= 4745	5) %			
Had cough in last two weeks					
Yes	891	18.8			
No	3854	81.2			
Short rapid breathing (n= 891)					
Yes	638	71.6			
No	245	27.5			
Don't know	8	0.9			
The cause of the difficult breathing (n= 638)					
Chest-related problem only	213	33.4			
Blocked/runny nose only	92	14.4			
Both blocked/runny nose and chest-related problem	325	50.9			
Don't know	8	1.3			

Table 3 indicates that medical consultation was sought from a health care provider in nearly 90.0% of the children. This is because 9.1% of the studied children received consultation from the pharmacist and 0.2%

received from non-medical sources. Private health care providers were the first source consulted in 38.7% of the cases

Table 3: Consultation about respiratory tract infections among the studied children, EDHS (2008).

Source consulted first about illness	No. (n=891)	0/0
Private health care provider	343	38.7
Pharmacist	81	9.1
Urban public hospital	80	9.0
Rural health unit	66	7.4
Urban health unit	20	2.3
Rural hospital	20	2.3
Urban public sector	19	2.1
Private hospital/clinic	9	1.0
Non-medical sources	2	0.2

Table 4 reveals that the studied children were most often given either less fluids than normal (34.2%) or about the same as usual (30.3%). More fluids than usual were given for 9.4% of the children. There also was a tendency for children to receive less food than normal (33.6%).

Table 4: Home management of acute respiratory tract infections among the studied children, EDHS (2008).

Item	No. (n=891)	%
Amount offered to drink		
Same as usual	270	30.3
Somewhat less	305	34.2
Much less	139	15.6
Nothing to drink	93	10.4
Much more	84	9.4
Amount offered to eat		
Same as usual	193	21.6
Somewhat less	299	33.6
Much less	146	16.4
Stopped food	102	11.4
Never gave food	135	15.2
Much more	16	1.8

As shown in Table 5, there are statistically significant differences between the diseased children and the other under 5 children in Upper Egypt regarding children age and sex. Children aged 6-23 months and male children were most likely had the symptoms of ARI. The proportion of the diseased children does not vary greatly with the religion, residence and birth order (P>0.05). Table 5 also illustrates those children who had acute respiratory tract infections had mean age more than the children without respiratory tract infection (28.98 \pm 17.48 and 25.18 \pm 16.99, respectively) with statistical significant difference.

Table 5: The relationship between the occurrence of acute respiratory tract infections and the personal characteristics the studied children, EDHS (2008).

Children had acute tract infecti						
Item	Yes (n= 8	394)	No (n= 3851)	=	P- value	
	No.	%	No.	%		
Age group (r	nonths)					
Less than 6	95	18.0	434	82.0		
6-	148	26.8	405	73.2		
12-	239	24.9	720	75.1	0.000*	
24-	143	15.4	783	84.6		
36-	133	15.0	756	85.0		
48- 59	136	15.3	753	84.7		
Mean ± SD	28.98±17	'.48	25.18±	16.99	0.000*	
Sex						
Male	485	20.0	1939	80.0	0.036*	
Female	409	17.6	1912	82.4		
Religion						
Muslim	839	19.0	3571	81.0	0.239	
Christian	55	16.4	280	83.6	'	
Residence						
Urban	253	20.5	980	79.5	0.080	
Rural	641	18.3	2871	81.7		
Birth order						
First	254	19.4	1056	80.6		
Second or third	369	18.6	1620	81.4	0.870	
Fourth or fifth	166	18.3	742	81.7	0.870	
Sixth or more	105	19.5	433	80.5		

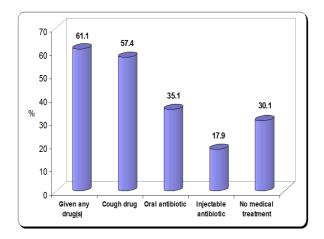


Figure 1: Distribution of given drugs to treat acute respiratory tract infections among the studied children, EDHS (2008).

Table 6 depicts that a statistical significant difference exists between children who had acute respiratory tract infections and non-diseased children regarding receiving BCG vaccine (99.0% versus 97.7%, respectively). 96.5% of the diseased children received the first dose of DPT vaccine compared to 94.7% of the non-diseased children with statistical significant difference. In general, 26.6% of the diseased children had ever vaccinated versus 35% of the non-diseased children with statistical significant difference. Figure 1 presents the home management of acute respiratory infections. Nearly two thirds of the children (61.1%) were given any drugs. Cough drugs and oral antibiotics were the most frequently given medicines. On the other hand, 30.1% of the children did not receive any medical treatment.

Table 6: The relationship between the occurrence of acute respiratory tract infections and the immunization status of the studied children, EDHS (2008).

	Children had acute respiratory tract infections			P-	
	Yes (894)	Yes (n=		No (n= 3851)	
	No.	%	No.	%	
Received BCG vaccine	885	99.0	3764	97.7	0.017*
Received DPT 1 vaccine	863	96.5	3646	94.7	0.021*
Received DPT 2 vaccine	819	91.6	3502	90.9	0.525
Received DPT 3 vaccine	764	85.5	3299	85.7	0.873
Received measles vaccine	703	78.6	3137	81.5	0.053
Received MMR vaccine	471	52.7	2510	65.2	0.000*
Had ever vaccinated	238	26.6	1346	35.0	0.000*

DISCUSSION

Acute respiratory tract infection is considered as one of the major public health problems and it is recognized as the leading cause of mortality and morbidity in many developing countries among children less than five year of age. 1 Analysis of DHS data provides more in depth understanding of child health issues in Egypt. In considering the acute respiratory tract infections findings, several points should be noticed. First, the prevalence of ARI varies seasonally, and the EDHS results represent the situation at the time of the interview from March to May 2008. The data also are subjected to a reporting error although the short reference period (two weeks) reduces the likelihood of such error. The symptoms which are collected in the EDHS such as cough with fast or difficult breathing involving a chest problem are signs of pneumonia but are less appropriate for assessing the presence of other ARI related conditions such as coughs, colds, wheezing, ear infection, and streptococcal sore

throat. Thus, the EDHS results do not provide information on the prevalence and treatment of the full range of ARI problems encountered in children. In the present study, 18.8% of the studied children suffered from a cough during the two-week period before the DHS. It is more than the prevalence of ARI among the national representative sample of children under 5 years of age who included in DHS 2008 which was 13.4%.7 However, it is less than that reported by El-Zanaty and Associates in DHS, 2014 (27.3%).8 These findings may be contributed to the prevalence of ARI is usually encouraged by many factors such as poor housing, overcrowding and low socio-economic factors. These factors are more common in the less privileged governorates of Upper Egypt. The prevalence of ARI in the present study is lower than that reported by Islam and his colleagues in India where the prevalence of ARI was found to be 26.2%. 11 A cross-sectional study conducted in Brazil reported that the prevalence of ARI in children under-five years was 25.6%. 12 On the other hand, the prevalence of ARI in the present study is higher than that reported in other studies. A study in Delhi reported that 14.6% of all under five children surveyed had an attack of ARI in the preceding two weeks. 13 Another study in Iraq reported that 6.9% of under five children had ARI in the last two weeks. ¹⁴ In the present study, the age group affected more frequently with acute respiratory tract infections was 6-23 months. This age group falls within the age of introduction of complementary feeding, decreased breast feeding with its disadvantages and decreased passive maternal immunity. These risk factors may have an effect on the incidence of ARI in this age group in the present study. This finding is nearly similar to that found by Ujunwa and Ezeonu who found that the age group most affected with ARI was 10-19 months.¹⁵ Montasser and his colleagues conducted a study for assessment and classification of acute respiratory tract infections among Egyptian rural children and found that the proportion of ARIs significantly reached its peak below 36 months then decreased with increasing of age of child.¹⁰ On the contrary, a study conducted by Siziya and his team showed that the prevalence of ARI was decreased in the age group 6-23 months. 14 In the present study, it was found that male children were more likely had ARI than female children. This finding is the same as the results of other studies. In a study conducted in Iraq, male children were more affected with ARI than females. They were 1.5 times more likely to develop ARI than females. Also, Yadav and his colleagues found that male sex was significantly affected with ARI in Nepal. 16 The present study showed that there is no statistically significant difference between ARI and residence but nearly one fifth of the urban children (20.5%) suffered from ARI compared to 18.3% of the rural children. This may probably because of a greater health seeking behaviour from the urban families than the rural ones. This is also reported by Ujunwa and Ezeonu who found that more children with ARI were from the urban areas than the rural areas. 15 This is not consistent with a study conducted by Yadav and his colleagues who found

statistically significant association between ARI cases and rural environment.16 Also, rural residences were found to have a significant effect on ARI severity in a study conducted in Iraq. Unnecessary antibiotic therapy and poor therapeutic choice or misuse contribute to bacterial resistance, drug toxicity and increased costs. So, improving antibacterial use in childhood respiratory tract infections is an important challenge for the physicians in charge.¹⁷ In the present study, medical consultation was sought from a health care provider for the vast majority of the diseased children. The private health care providers were the first source consulted by the mothers followed by the pharmacists. Sreeramareddy and his colleagues found that the pharmacies (46.2%) were the most common facilities where care was sought followed by medical practitioners (26.4%). ¹⁸ Also, a study conducted in Egypt showed that many of the parents prefer to treat their children at home or take consultation from pharmacies. 10 In the present study, about two thirds of the children (61.1%) received medication. Cough drugs were given to more than half of those children (57.4%) and oral antibiotics to one third of them (35.1%). On the other hand, nearly one third of the mothers (30.1%) did not give their children any medical treatment. The results of the present study are comparable to results of other studies. Montasser and other researchers in their study on a sample from Egyptian rural children proved that the parents of children suffered from ARI did not ask medical care except when the condition becomes worse.¹⁰ Yousif and Khaleq reported that when the child gets an ARI attack, the mother would take him to a private clinic in 42.8% of cases, health centre in 14.4%, hospital in 12.0%, public clinic in 12.0%, only home management in 10.6%, using drugs from pharmacy in 6.0%, and would do nothing in 2.2% only. Antipyretics and antibiotics were the most common types of medications used by the cases. Regarding the immunization status of the studied groups, the present study found that children who had ever vaccinated were less likely to develop ARI than who had not ever vaccinated. This is consistent with a study conducted in Nigeria by Ujunwa and Ezeonu who found that poor immunization status was found to significantly affect the prevalence of ARIs. 15 Yadav and his colleagues also proved that incomplete immunization for age was a risk factor for ARI. 16 Other study reported that there were 2.5 times more chances of having ARIs for children who were incompletely immunized. ¹⁹ On the other hand, Montasser and his colleagues reported that immunization status showed no significant association with the proportion of ARIs.10

CONCLUSION

Children aged 6-23 months and male children were affected most likely with ARIs. Paediatricians and general practitioners should take their role in proper counselling of caregivers on the proper child care at home

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Institutional Ethics Committee

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